

CLAIMS

1. A method for use in troubleshooting a call in a wireless communication system by a computer test station, the method comprising:

5 receiving a telephone call from a wireless unit while the wireless unit is simultaneously connected in a call;

receiving, during the telephone call, first information which identifies the wireless unit and second information which identifies a wireless switch utilized in the call;

10 sending, during the telephone call, a call trace request using of the first and the second information; and

receiving, in response to sending the call trace request, call trace information including information that identifies a plurality of devices of the wireless switch utilized in the call.

15 2. The method according to claim 1 wherein receiving the first information comprises receiving caller identification (ID) information.

3. The method according to claim 1 wherein receiving the second information comprises receiving dual-tone multiple-frequency (DTMF) digits
20 corresponding to a wireless switch identifier.

4. The method according to claim 1, wherein receiving call trace information comprises receiving information which identifies one echo canceller
25 of a plurality of echo cancellers of the wireless switch utilized in the call.

5. The method according to claim 1, wherein sending the call trace request with use of the first and the second information comprises sending, to an address corresponding to the wireless switch, a trace command having caller ID
30 information corresponding to the wireless unit.

6. The method according to claim 1, further comprising:
sending a message including at least portions of the call trace information
to the wireless unit.

7. The method according to claim 1, further comprising:
sending a message including at least portions of the call trace information
to a preselected address.

8. The method according to claim 1, further comprising:
recording and storing audio signals from the call as data in a file; and
sending a message including at least portions of the call trace information
and the file to a preselected address.

9. A computer test station for troubleshooting a call in a wireless
communication system, the computer test station comprising one or more
processors that:

receive a telephone call from a wireless unit while the wireless unit is
simultaneously connected in a call;

receive, during the telephone call, first information which identifies the
wireless unit and second information which identifies a wireless switch utilized
in the call;

send, during the telephone call, a call trace request with use of the first and
the second information; and

receive, in response to sending the call trace request, call trace information
including information that identifies a plurality of devices of the wireless switch
utilized in the call.

10. The computer test station according to claim 9 wherein, to receive the first information, said one or more processors are further executable to receive caller identification (ID) information.

5 11. The computer test station according to claim 9, wherein, to receive the second information, said one or more processors are further executable to receive dual-tone multiple-frequency (DTMF) digits corresponding to a wireless switch identifier.

10 12. The computer test station according to claim 9, wherein, to receive the call trace information, said one or more processors are further executable to receive information which identifies one echo canceller of a plurality of echo cancellers at the wireless switch utilized in the call.

15 13. The computer test station according to claim 9, wherein said one or more processors are further executable to send, to an address corresponding to the wireless switch, a trace command having caller ID information corresponding to the wireless unit.

20 14. The computer test station according to claim 9, wherein said one or more processors are further executable to send a message including at least portions of the call trace information to the wireless unit.

25 15. The computer test station according to claim 9, wherein said one or more processors are further executable to send a message including at least portions of the call trace information to a preselected address.

30 16. The computer test station according to claim 9, wherein said one or more processors are further executable to record audio signals from the call and store the recording as data in a file; and send a message including at least

portions of the call trace information and the file storing the audio signals to a preselected address.

17. A method for testing the operation of a wireless unit within a wireless communication system by a computer test station located remotely from the wireless unit, the method comprising:

receiving a telephone call from the wireless unit;

receiving, during the telephone call, signals for selecting one of a plurality of test functions;

receiving, during the telephone call, one or more parameters for execution of the selected test function; and

executing, after termination of the telephone call, a predetermined test process corresponding to the selected test function using the one or more parameters.

18. The method according to claim 17, wherein executing a predetermined test process comprises initiating one or more telephone connection requests to the wireless unit.

19. The method according to claim 17, further comprising:
receiving caller identification (ID) information of the wireless telephone unit in response to receiving the telephone call; and

wherein executing a predetermined test process comprises initiating one or more telephone connection requests to the wireless telephone unit using the caller ID information.

20. The method according to claim 17, wherein the one or more parameters comprise time information indicative of a time at which the predetermined test process is to be executed.

21. The method according to claim 17, wherein the one or more parameters comprise time information indicative of a time duration over which the predetermined test process is to be executed.

5 22. The method according to claim 17, wherein the one or more parameters comprise repetition information indicative of how many times a predetermined function will be executed.

23. The method according to claim 17, wherein the predetermined test
10 process corresponds to an answered call test comprising:

initiating a telephone connection request to the wireless unit;
detecting whether a connection was made with the wireless unit after
initiating the telephone connection request;
repeating the initiating and detecting a total number of N times, wherein
15 N is a number indicated in the one or more parameters; and
storing data indicative of a number of connections made with the wireless
unit during the repeated initiating and detecting.

24. The method according to claim 17, wherein the predetermined test
20 process corresponds to a dropped call test comprising:

sending audio signals during a telephone connection with the wireless
unit;
detecting a disconnection with the wireless unit;
initiating a telephone connection request to the wireless unit if a
25 disconnection is detected;
repeating the sending, detecting, and initiating over a time period T,
wherein T is indicated in the one or more parameters; and
storing data indicative of a number of disconnections with the wireless
unit over the time period T.

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25. A computer test station for testing the operation of a remote wireless unit within a wireless communication system, the computer test station having one or more processors operative to;

receive a telephone call from the wireless telephone unit;

5 receive, during the telephone call, signals for selecting one of a plurality of test functions;

receive, during the telephone call, one or more parameters for execution of the selected test function; and

10 execute, after termination of the telephone call, a predetermined test process corresponding to the selected test function using the one or more parameters.

26. The computer test station according to claim 25 wherein, to execute a predetermined test process, said one or more processors are further operative
15 to initiate one or more telephone connection requests to the wireless unit.

27. The computer test station according to claim 25 wherein said one or more processors are further operative to receive caller identification (ID) information of the wireless unit in response to receiving the telephone call; and to
20 initiate one or more telephone connection requests to the wireless unit using the caller ID information during execution of the predetermined test process.

28. The computer test station according to claim 25, wherein the one or more processors are further operative to execute the predetermined test process
25 using one or more parameters comprising time information indicative of a time at which the predetermined test process is to be executed.

29. The computer test station according to claim 25, wherein the one or more processors are further operative to execute the predetermined test process

using one or more parameters comprising time information indicative of a time duration over which the predetermined test process is to be executed.

30. The computer test station according to claim 25, wherein the one or
5 more processors are further operative to execute the predetermined test process using one or more parameters comprising repetition information indicative of how many times a predetermined function will be executed.

31. The computer test station according to claim 25, wherein the one or
10 more processors are operative to execute a predetermined test process corresponding to an answered call test comprising the steps of:

initiating a telephone connection request to the wireless unit;

detecting if a connection was made with the wireless telephone unit in
response to initiating the telephone connection request;

15 repeating the initiating and detecting a total number of N times, wherein N is a number indicated in the one or more parameters; and

storing, at the computer test station, data indicative of a number of
connections made with the wireless unit during the repeated initiating and
detecting.

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32. The computer test station according to claim 25, wherein the one or
more processors are operative to execute a predetermined test process
corresponding to a dropped call test function comprising the steps of:

25 sending audio signals during a telephone connection with the wireless unit;

detecting a disconnection with the wireless unit;

initiating a telephone connection request to the wireless unit if a
disconnection is detected;

30 repeating the sending, detecting, and initiating over a time period T,
wherein T is indicated in the one or more parameters; and

storing data indicative of a number of disconnections with the wireless unit over the time period T.

33. A method for use in testing the operation of a wireless unit within a wireless communication system by a computer test station located remotely from the wireless unit, the method comprising:

receiving caller identification (ID) information associated with a wireless unit during a wireless communication therefrom;

receiving dual-tone multiple frequency (DTMF) signals from the wireless unit during the wireless communication;

selecting one of a plurality of test functions based on the DTMF signals;

after termination of the wireless communication, executing the selected test function and receiving test data associated with the wireless unit; and

storing the test data in association with the caller ID information.

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34. The method according to claim 33, further comprising:

repeating the steps of receiving, selecting, executing, and storing for one or more other wireless units.

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35. The method according to claim 34, wherein executing the selected test function comprises executing an answered call test.

36. The method according to claim 34, wherein executing the selected test function comprises executing a dropped call test.

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37. A method for use in simultaneously testing a plurality of wireless telephone units operative for wireless communications, the method comprising:

receiving first caller identification (ID) information associated with a first wireless unit;

performing a first test function during a first time period in connection with the first wireless unit and generating first test data therefrom;

storing the first test data in association with the first caller ID information;

receiving second caller identification (ID) information associated with a second wireless unit;

performing a second test function during a second time period in connection with the second wireless unit and generating second test data therefrom; and

storing the second test data in association with the second caller ID information.

38. The method according to claim 37, wherein the first time period during which the first test function is performed may overlap with the second time period during which the second test function is performed.

39. A method for use in providing a telephone unit with remote access to functions of a computer processor, the method comprising:

receiving a telephone call from a telephone unit;

receiving a caller identification (ID) number of the telephone unit upon receiving the telephone call;

comparing the caller ID number with a plurality of prestored caller ID numbers; and

granting or denying access to functions of the computer processor based at least in part on the comparing.

40. The method according to claim 39, wherein the granting or denying access further comprises:

granting access if the caller ID number matches one of the prestored caller ID numbers; and

denying access if the caller ID number does not match any one of the prestored caller ID numbers.

41 The method according to claim 39, further comprising:
5 receiving a personal identification number (PIN) selected at the telephone unit;

comparing the PIN with a prestored PIN associated with a prestored caller ID number that matches the received caller ID number; and

wherein granting or denying access is based at least in part on the
10 comparing of the caller ID number and the comparing of the PIN.

42. The method according to claim 39, further comprising:
receiving a personal identification number (PIN) selected at the telephone
unit;

15 comparing the PIN with a prestored PIN associated with a prestored caller ID number that matches the received caller ID number;

wherein granting or denying access further comprises:

granting access if the caller ID number matches one of the prestored
caller ID numbers and if the PIN matches the prestored PIN associated with the
20 prestored caller ID number; and

denying access if the caller ID number does not match any one of
the prestored caller ID numbers or the PIN does not match the prestored PIN
associated with the prestored caller ID number.

25 43 The method according to claim 39, further comprising:
if access is granted, receiving, at the computer processor during the
telephone call, signals for selecting a function.

44. A method for use in testing the operation of a wireless telephone unit within a wireless communication system by a computer test station located remotely from the wireless telephone unit, the method comprising:

initiating a telephone connection request to the wireless telephone unit;

5 detecting whether a connection was made with the wireless telephone unit in response to initiating the telephone connection request;

repeating the initiating and detecting N times; and

storing data indicative of a number of connections made with the wireless telephone unit during the repeated initiating and detecting.

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45. The method according to claim 44, further comprising:

prior to initiating the telephone connection requests:

receiving a telephone call from the wireless telephone unit;

15 receiving, during the telephone call, signals for selecting a test function corresponding to the initiating, detecting, repeating and storing; and

wherein the repeated initiating and detecting is executed in response to selecting the test function.

46. The method according to claim 44, further comprising:

20 prior to initiating the telephone connection requests:

receiving a telephone call from the wireless telephone unit;

receiving, during the telephone call, signals for selecting a test function corresponding to the initiating, detecting, repeating and storing;

25 receiving, during the telephone call, signals for selecting the number N;

storing data indicative of the number N for subsequent use in executing the selected test function; and

wherein the repeated initiating and detecting is executed in response to selecting the test function.

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47. The method according to claim 44, further comprising:
prior to initiating the telephone connection requests:

receiving a telephone call from the wireless telephone unit;

receiving, during the telephone call, signals for selecting a test
5 function corresponding to the initiating, detecting, repeating and storing;

receiving, during the telephone call, signals for selecting a time or
time delay for executing the test function;

storing data indicative of the time or time delay for executing the
test function; and

10 wherein the repeated initiating and detecting is executed at the selected
time or time delay in response to selecting the test function.

48. The method according to claim 44, further comprising:
prior to initiating the telephone connection requests:

15 receiving a telephone call from the wireless telephone unit;

receiving caller identification (ID) information of the wireless
telephone unit in response to receiving the telephone call;

receiving, during the telephone call, signals for selecting a test
function corresponding to the initiating, detecting, repeating and storing; and

20 wherein the repeated initiating and detecting is executed in response to
selecting the test function and in connection with the wireless telephone unit
associated with the caller ID information.

49. The method according to claim 44, further comprising:
25 prior to initiating the telephone connection requests:

receiving a telephone call from the wireless telephone unit;

receiving caller identification (ID) information of the wireless
telephone unit in response to receiving the telephone call;

receiving, during the telephone call, signals for selecting a test
30 function corresponding to the initiating, detecting, repeating and storing;

receiving, during the telephone call, signals for selecting the number N;

storing data indicative of the number N for subsequent use in executing the selected test function; and

5 wherein the repeated initiating and detecting is executed in response to selecting the test function and in connection with the wireless telephone unit associated with the caller ID information.

10 50. The method according to claim 44, further comprising:
prior to initiating the telephone connection requests:

receiving a telephone call from the wireless telephone unit;

receiving caller identification (ID) information of the wireless telephone unit in response to receiving the telephone call;

15 receiving, during the telephone call, signals for selecting a test function corresponding to the initiating, detecting, repeating and storing;

receiving, during the telephone call, signals for selecting a time or time delay for executing the test function;

20 storing data indicative of the time or time delay for executing the test function; and

wherein the repeated initiating and detecting is executed at the selected time or time delay in response to selecting the test function and in connection with the wireless telephone unit associated with the caller ID information.

25 51. A method for use in testing the operation of a wireless telephone unit within a wireless communication system by a computer test station located remotely from the wireless telephone unit, the method comprising:

sending audio signals during a telephone connection with the wireless telephone unit;

30 detecting a disconnection with the wireless telephone unit;

initiating a telephone connection request to the wireless telephone unit if a disconnection is detected;

repeating the sending, and any detecting and initiating, over a time period T; and

5 storing data indicative of a number of disconnections with the wireless telephone unit over the time period T.

52. The method according to claim 51, further comprising:
prior to sending:

10 receiving a telephone call from the wireless telephone unit;
receiving, during the telephone call, signals for selecting a test function corresponding to the repeated sending, detecting, and initiating; and
wherein the repeated sending, detecting, and initiating is executed in response to selecting the test function.

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53. The method according to claim 51, further comprising:
prior to sending:

receiving a telephone call from the wireless telephone unit;
receiving, during the telephone call, signals for selecting a test
20 function corresponding to the initiating and repeated sending, detecting, and initiating; and

receiving, during the telephone call, signals for selecting the time period T;

25 storing data indicative of the time period T for subsequent use in
executing the selected test function; and

wherein the repeated initiating and detecting is executed in response to selecting the test function.

54. The method according to claim 51, further comprising:
prior to sending:

receiving a telephone call from the wireless telephone unit;

receiving, during the telephone call, signals for selecting a test
5 function corresponding to the initiating and repeated sending, detecting, and
initiating; and

receiving, during the telephone call, signals for selecting a time or
time delay to execute the test function;

storing data indicative of the time or time delay to execute the test
10 function; and

wherein the repeated sending, detecting, and initiating is executed at the
time or time delay in response to selecting the test function.

55. The method according to claim 51, further comprising:
15 prior to sending:

receiving a telephone call from the wireless telephone unit;

receiving caller identification (ID) information of the wireless
telephone unit in response to receiving the telephone call;

receiving, during the telephone call, signals for selecting a test
20 function corresponding to the initiating and repeated sending, detecting, and
initiating; and

wherein the repeated sending, detecting, and initiating is executed in
response to selecting the test function and in connection with the wireless
telephone unit associated with the caller ID information.

25 56. The method according to claim 51, further comprising:
prior to sending:

receiving a telephone call from the wireless telephone unit;

receiving caller identification (ID) information of the wireless
30 telephone unit in response to receiving the telephone call;

receiving, during the telephone call, signals for selecting a test function corresponding to the initiating and repeated sending, detecting, and initiating;

receiving, during the telephone call, signals for selecting the time
5 period T;

storing data indicative of the time period T for subsequent use in
executing the selected test function; and

wherein the repeated sending, detecting, and initiating is executed in
response to selecting the test function and in connection with the wireless
10 telephone unit associated with the caller ID information.

57. The method according to claim 51, further comprising:
prior to sending:

receiving a telephone call from the wireless telephone unit;

receiving caller identification (ID) information of the wireless
15 telephone unit in response to receiving the telephone call;

receiving, during the telephone call, signals for selecting a test function corresponding to the initiating and repeated sending, detecting, and
initiating;

receiving, during the telephone call, signals for selecting a time or
20 time delay to execute the test function;

storing data indicative of the time or time delay to execute the test
function; and

wherein the repeated sending, detecting, and initiating is executed at the
25 selected time or time delay in response to selecting the test function and in
connection with the wireless telephone unit associated with the caller ID
information.

58. A test station for testing the operation of a wireless telephone unit within a wireless communication system, the test station comprising:

a computer;

wireless communication test software residing on memory that is accessible to the computer;

a computer telephony card coupled to the computer; and

the computer telephony card having a plurality of telephone line interfaces, each telephone line interface associated with a respective one of a plurality of telephone numbers of a hunt group.

59. The test station according to claim 58, wherein the plurality of telephone numbers of the hunt group are accessible by an abbreviated dialing telephone number.

60. A test station for testing a wireless telephone unit within a wireless communication system, the test station comprising:

a computer;

wireless communication test software residing on memory that is accessible to the computer;

a computer telephony card coupled to the computer; and

the computer telephony card having at least one telephone line interface that is accessible by an abbreviated dialing telephone number.

61. The test station according to claim 60, further comprising:

the at least one telephone line interface comprising a plurality of telephone line interfaces, each interface of the plurality of telephone line interfaces being associated with a respective one of a plurality of telephone numbers of a hunt group, the hunt group being accessible by the abbreviated dialing telephone number.

62. A telecommunication system method for providing a plurality of wireless telephone units with remote access to a computer test station, the method comprising:

5 receiving an abbreviated dialing telephone number to establish a telephone call connection;

selecting one of a plurality of telephone numbers of a hunt group that is associated with the abbreviated dialing telephone number, each one of the plurality of telephone numbers associated with a computer test station; and

10 facilitating the telephone call connection between a wireless telephone unit and the computer test station with use of the selected telephone number.

63. The method according to claim 62, wherein the step of receiving comprises receiving the abbreviated dialing telephone number at a mobile telephone switch.

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